

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

A DEHYDRATOR FOR MAINTAINING LOW ATMOSPHERIC HUMIDITIES
IN SMALL INCUBATORS

By K. D. Arbuthnot, Division of Cereal and Forage Insect
Investigations, Bureau of Entomology and Plant
Quarantine, U. S. Department of Agriculture

This apparatus has been used successfully in experimental work with Pyrausta nubilalis Hbn. and its parasites. By its use humidities as low as 30 percent, with differentials of less than 5 percent, have been satisfactorily maintained in incubators, each having an air capacity of 30 cubic feet. These incubators were operated in constant-temperature rooms at 40° to 80° F. Under conditions which required the removal of the greatest amounts of moisture from the air, it was necessary to change the drying agent (calcium chloride) at intervals of 4 or 5 days.

The air-conditioning chamber is constructed as follows (the letters in parentheses refer to figs. 1 and 2): A metal cylinder (E), 4 inches in diameter and 8 inches long, forms the outer part of the chamber. One end of this cylinder is closed (F) and the other is open. In the center of the closed end is cut a hole (G) large enough to admit the round end (D) of the air circulator. A metal collar (H), 1 inch in length, is fitted closely inside the cylinder (E). Over the inner end of this collar is soldered a disk of $\frac{1}{4}$ -inch-mesh screen (I). The container for the drying agent (J) is an open cylinder, 3 inches in diameter and 6 inches in length, constructed of $\frac{1}{4}$ -inch-mesh screen. One end of this is soldered to the inner side of the screen disk (I) and concentric to it. Against the other end is placed a metal disk (K) which fits closely inside the outer cylinder (E). On the inner surface of this latter disk, and concentric to it, is soldered a thin ring of metal (L) which fits closely around the end of the screen container (J). Over an opening, $2\frac{1}{2}$ inches in diameter, in the center of this disk, is soldered a piece of $\frac{1}{4}$ -inch-mesh screen (M). A metal collar (N), 1 inch in length, fits closely inside the outer cylinder (E) and is soldered to a metal disk (O) of the same diameter, to form a removable cap. The disk (O) has an opening $1\frac{1}{2}$ inches in diameter in its center, into which is fastened the larger end of a celluloid funnel (P), 2 inches in length, with the smaller opening (Q) 1 inch in diameter. A wooden base (R) is fitted under the ends of the assembled air-conditioning chamber, with a raised portion (S) providing a support for the air circulator. This holds the assembled apparatus in a rigid position. All metal parts are of nonrusting metal.

In assembling, the screen container (J) of the unit (H, I, J) is filled with the drying agent and placed inside of the cylinder (E). The removable cap (N and O) holds the metal disk (K) tightly against the drying-agent container (J), the open end of which is fitted into the ring (L), and thus held in the center of the outer cylinder (E).

The air circulator is an electric "whisk broom" type of vacuum cleaner, the motor of which is shown as (A) and the fan as (B). The sweeper and air inlet (suction end of the vacuum cleaner) are sawed off at (C) so that no part extends beyond the fan casing. The end of the air outlet (to which the dirt-collecting bag of the vacuum cleaner was attached) is also sawed off, leaving about an inch of the round section (D). This removal of unused portions of the vacuum cleaner reduces the space occupied by the equipment in the incubator.

Air from the incubator is forced by the air circulator through the air-conditioning chamber. The screen disk (I) and the screen container (J) permit an even diffusion of the air through the drying agent. The solid metal part of the disk (K) serves as a baffle to insure that all of the air comes into contact with the drying agent before its return to the incubator.

Two container units (H, I, J) are constructed for each assembly. When necessary to renew the drying agent, a container filled with fresh calcium chloride is substituted for the used one in the dehydrator. Thus the incubator is opened only once for each change of material, and ample time is allowed for the cleaning of the used container.

The drying agent used has the following catalog description: "Calcium chloride, technical, granular (dry) 4 mesh, for desiccators." In operation, the air circulator is governed by a hygrostat (actuated whenever the humidity rises above the percent at which it is set), as described by Baker and Arbuthnot (Baker, W. A., and Arbuthnot, K. D. An Incubator Room. Jour. Econ. Ent. 24: 444-449, illus. 1931).

Explanation of Illustrations

Figure 1.--Cross-section diagram of complete assembly.

Figure 2.--Cross-section diagram of unassembled dehydration chamber.

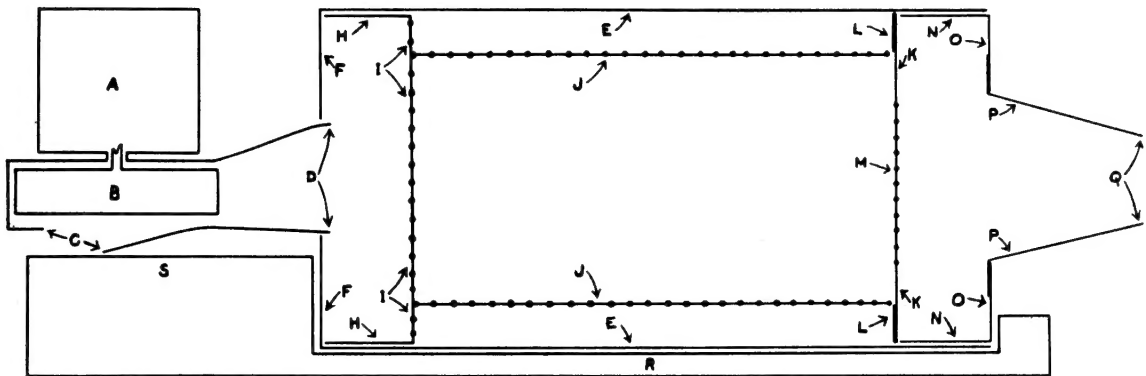


FIG. 1.

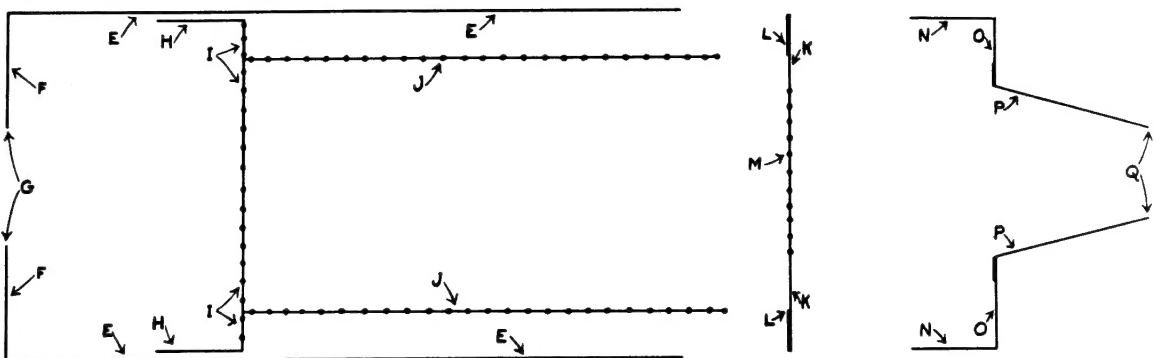


FIG. 2.

